ATTACHMENT ONE

SUMMARY OF PROPOSED BASIN PLAN AMENDMENT

Total Maximum Daily Loads (TMDLs) for Toxicity and Pesticides
in the Santa Maria Watershed

Background Information:

Section 303(d) of the Federal Clean Water Act requires every state to evaluate the water quality of its waters, and maintain a list of waters that are considered "impaired", which means to exceed water quality standards. For each water on the Central Coast's "303(d) Impaired Waters List," the California Central Coast Water Board (Water Board) must also develop Total Maximum Daily Loads (TMDLs) to restore clean water.

TDMLs are plans that determine the sources of water quality impairments in the watershed and the TMDLs of pollutants that a water can receive and still achieve water quality standards. To ensure water quality to standards are met, pollutant loads are allocated to sources such that the sum of the allocations meet water quality standards. The TMDL also includes an implementation plan that describes activities and measures to address water quality problems and a water quality monitoring plan. The TMDL process includes stakeholder involvement and input. TMDLs are incorporated into the Central Coast Basin Plan, which is the legal document that describes how water quality is managed in the Central Coast Region. Once adopted the TMDL would be incorporated into Water Board regulatory programs for implementation.

TMDL Project Area

The geographic scope of the Santa Maria Watershed TMDL encompasses the 1,856 square mile Santa Maria Hydrologic Unit (HU) located along the border of northern Santa Barbara and southern San Luis Obispo Counties and with-in the boarder of northwestern Ventura County. The Santa Maria HU is located in the jurisdiction of the Central Coast Regional Water Quality Control Board. In the TMDL project area there are three major subwatersheds: the Sisquoc watershed and the Cuyama and the Santa Maria Valleys. The Sisquoc and Cuyama areas are primarily undeveloped as are the foothills of the Santa Maria Valley. The polluted water bodies are located in the flat valley floor of the Santa Maria Valley, which has urban development and extensive irrigated agriculture lands. The Santa Maria Valley is a coastal valley with a strong marine influence that moderates the climate making it a prime area for cool season vegetable and berry production.

Impairments Addressed

This TMDL addresses toxicity and pesticide impairments that are based on standards in the Basin Plan. The Basin Plan has the following narrative general objectives for toxicity and for pesticides, which apply to all surface waters:

General Objective for Toxicity:

> *All waters shall be maintained free of toxic substances in concentrations which are toxic to, or which produce detrimental physiological responses in, human, plant, animal, or aquatic life. Compliance with the objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, toxicity bioassays of appropriate duration, or other appropriate methods.*

General Objective for Pesticides:

> *No individual pesticide or combination of pesticides shall reach concentrations that adversely affect beneficial uses. There shall be no increase in pesticide concentrations found in bottom sediments or aquatic life.*

Pollutants Addressed

The specific pollutants addressed in the TMDL are pesticides. Several water quality studies have associated toxicity impairments with detections of currently applied pesticides. The currently applied pesticides are in two general pesticide classes; one is organophosphate pesticide (diazinon and chlorpyrifos) and the other is synthetic pyrethroids.

In addition to addressing currently applied pesticides, the TMDL addresses surface water impairment from legacye organochlorine pesticides (e.g., DDT, DDE, toxaphene). Legacy pesticidesare persistent and bioaccumulate in the environment they were present in water and sediment and inand were detected in fish tissue samples.

Proposed Basin Plan Amendment

Staff is proposing these total maximum daily loads and allocations because these beneficial uses are not being supported due to violations of the aforementioned water quality objectives. Accordingly, this TMDL project will recommend Central Coast Water Board and State Water Board approve a basin plan amendment to establish and implement Total Maximum Daily Loads for toxicity and pesticides in the Santa Maria watershed.

ATTACHMENT TWO

DESCRIPTION OF SCIENTIFIC ASSUMPTIONS, FINDINGS, AND CONCLUSIONS TO BE ADDRESSED BY PEER REVIEWERS

Total Maximum Daily Loads (TMDLs) for Toxicity and Pesticides
in the Santa Maria Watershed

The statute mandate for external scientific peer review (Health and Safety Code Section 57004) states that the reviewer's responsibility is to determine whether the scientific portion of the proposed rule is based upon sound scientific knowledge, methods, and practices.

Accordingly, we request that you make this determination for each of the following issues that constitute the scientific basis of the proposed regulatory action. An explanatory statement is provided for each issue to focus the review.

Additionally, note that a complete TMDL must contain all of the following elements in order to be approved by the U.S. EPA: 1) Problem Statement; 2) Numeric Targets; 3) Source Analysis; 4) Allocations; 5) Implementation Plan; 5) Linkage Analysis; 6) Monitoring Plan; 7) Margin of Safety. However, from the perspective of striving for adequate scientific credibility to support this TMDL, staff recommends that the following discrete TMDL elements require the bulk of critical focus and scrutiny on the scientific basis underlying these elements:

1) Numeric Targets
2) Source Analysis
3) TMDLs and Allocations
4) Implementation
5) Monitoring

As such, the elements of this TMDL staff are recommending focused peer review are outlined below:

1. **<u>Numeric Targets -</u>** ***Primary Scientific Issue:*** **The scientific basis for the assignment of numeric targets for specific pesticides addressed in the TMDL.**

Numeric targets are measurable indicators that demonstrate attainment of water quality standards. The foundation of the numeric targets in this TMDL are narrative water quality objectives in the Central Coast Basin Plan (Basin Plan) for toxicity. To develop numeric targets, staff researched and applied published water, sediment and tissue toxicity guidelines to interpret the objectives in the Basin Plan. In addition, pesticides can have additive toxicity and staff applied an additive toxicity formula and developed toxicity unit targets for organophosphate pesticides. The specific numeric targets developed for the TMDL and reference papers are located in Attachment Five.

Table 1 Chemicals and Numeric Targets Developed for the TMDL

Chemicals	Numeric Targets			
	Water	**Sediment**	**Tissue**	**Toxicity Unit**
Chlorprifos	x	x		x
Diazinon	x			x
Malathion	x			
Synthetic Pyrethroids	x	x		x
DDTs	x	x	x	
Dieldrin	x	x	x	
Endrin		x		
Toxaphene	x	x	x	

2. **<u>Source Analysis -</u>** ***Primary Scientific Issue:*** **The methodologies, data and assumptions used , and conclusions made in identifying probable source categories contributing toxicity and pesticide pollution in surface waters.**

Surface waters in the Santa Maria watershed are impaired for Unknown toxicity, sediment toxicity and specific pesticides. Several studies in the watershed indicate that the unknown toxicity and the sediment toxicity are associated with currently applied organophosphate and pyrethroid pesticides. In addition for the development of the TMDL, additional toxicity and pesticide monitoring was conducted by UC Davis that confirmed the association of toxicity to currently applied pesticides (Phillips, 2010). Therefore the focus of the source analysis for toxicity is on these pesticide groups.

The sources of pesticides were analyzed by pesticide group (organophosphate, synthetic pyrethroid and organochlorine) since the groups share general chemical properties and environmental fate and transport mechanisms. The groups also have common uses and application timeframes.

Both organophosphate and synthetic pyrethroids are currently applied pesticides, therefore, sources of commercial applications reported to the California Department of Pesticide Regulations (DPR) were analyzed at the watershed level (CDPR, 2000). This analysis coincided with water quality monitoring.

The use of organochlorine pesticides has been banned for many years, but they are very persistent in the environment. Staff analyzed reports on historic use and tributary streams and channels were monitored to assess sources.

In addition, land cover and land use was analyzed in the watershed and subwatersheds to evaluated sources of pollutants.

3. **<u>TMDLS and Allocations -</u>** ***Primary Scientific Issue: The scientific and technical basis of the proposed TMDLs and allocation.***

TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure [40 CFR §130.2(I)]. Staff is proposing concentration-based TMDLs. Staff proposes the TMDLs as the same set of concentrations as staff proposed in the numeric targets section.

The TMDL load allocations are equal to the numeric targets. Discharges shall not exceed the loading capacity of the water body, which is set at the proposed numeric targets. All identified responsible parties within the TMDL project will be held to these waste load and load allocations.

Although the TMDLs are officially expressed in terms of concentration, the daily loading capacity for impaired waters is expressed in the project report through load duration curve analysis. Daily Load Expressions represent an alternative way to express the concentration-based allocations for water soluble pesticide such as diazinon and chlorpyrifos. The mass-based daily load expressions do not formally constitute the TMDL or the allocations.

4. **<u>Implementation -</u>** ***Primary Scientific Issue: The technical basis of the proposed implementation and monitoring plans.***

Due to the types of water quality problems, pesticide properties and nature of the sources, the TMDL implementation is divided into two implementation plans, one for currently applied pesticides and one for legacy organochlorine pesticides.

<u>Implementation Plan Currently Applied Pesticides</u>

The TMDL implementation plan for currently applied pesticides utilizes an interagency approach between DPR and the Water Boards to address pesticide impairments in the Santa Maria Watershed. The approach is described in the California Pesticide Management Plan for Water Quality (California Pesticide Plan), which is an implementation plan of the Management Agency Agreement (MAA) between DPR and the Water Boards. The Water Boards and DPR have responsibilities to protect water quality from the potential adverse effects of pesticides and the MAA was established to provide a unified cooperative program to protect water quality related to the use of pesticides (CEPA 1997).

The California Pesticide Plan outlines a four-stage approach to respond to pesticide water quality problems. The approach includes stages for education and outreach, self-regulating compliance and mandatory regulatory actions by the two agencies. In addition the TMDL relies on regulatory pesticide label changes by United States

Environmental Protection Agency on the application of diazinon and pyrethroids to address water quality problems.

Implementation Plan for Legacy Organochlorine Pesticides

For the organochlorine pesticide implementation plan staff proposes a community-based watershed approach to address organochlorine pesticide water quality problems in the Santa Maria watershed with the implementation lead by stakeholders (EPA, 2005). Staff proposes a community-based watershed approach due to the complex nature of organochlorine pesticides in the environment, the extended duration of organochlorine pesticide water quality problems, and the broad stakeholder group necessary to address this problem. While a community-based watershed approach is recommended to address organochlorine problems, the primary regulatory responsibility for the OC pesticide implementation plan is with the landowners in the watershed with sites that are the sources of organochlorine pesticides. A landowner stakeholder group shall be developed to support implementation of the TMDL.

5. **Monitoring Plan -** ***Primary Scientific Issue: The scientific and technical basis of the proposed monitoring plan***

Monitoring Plan Currently Applied Pesticides

The monitoring of currently applied pesticides is the responsibility of dischargers enrolled in existing storm water and irrigated agricultural lands regulatory programs (Ag. Order) with the Water Board. The TMDL monitoring plan builds on existing regulatory watershed monitoring programs such as the monitoring and reporting program for the Agricultural Order. The Agricultural Order monitoring program requires annual toxicity sampling and testing, twice in the dry season and twice in the wet season. The order also requires corresponding testing of specific pesticides during the second year of the five year order.

Monitoring Plan for Legacy Organochlorine Pesticides

Staff recommends a comprehensive watershed and coastal monitoring program for organochlorine pesticides pollution. Due to significant health concerns from organochlorine pesticides, their persistence in the environment and bioaccumulation in the food chain, a long-term monitoring program is needed to provide consistent monitoring of sediment and regular feedback on the safety of fish for human consumption.

6. **The Big Picture**

Reviewers are not limited to addressing only the specific issues presented above,

and are asked to contemplate the following questions:

a) **In reading the technical reports and proposed implementation language, are there any additional scientific issues that are part of the scientific basis of the proposed rule not described above? If so, please comment with respect to the statute language given above.**
b) **Taken as a whole, is the scientific portion of the proposed rule based upon sound scientific knowledge, methods, and practices?**

Reviewers should also note that some proposed actions may rely significantly on professional judgment where available scientific data are not as extensive as desired to support the statute requirement for absolute scientific rigor. In these situations, the proposed course of action is favored over no action.

The preceding guidance will ensure that reviewers have an opportunity to comment on all aspects of the scientific basis of the proposed Board action. At the same time, reviewers also should recognize that the Board has a legal obligation to consider and respond to all feedback on the scientific portions of the proposed rule. Because of this obligation, reviewers are encouraged to focus feedback on the scientific issues that are relevant to the central regulatory elements being proposed.

ATTACHMENT THREE

INDIVIDUALS INVOLVED IN THE PREPARATION OF PROPOSED BASIN PLAN AMENDMENT

for the
Total Maximum Daily Loads (TMDLs) for Toxicity and Pesticides
in the Santa Maria Watershed

Central Coast Water Board staff is largely responsible for drafting and completing the proposed TMDLs. Staff developed these TMDLs consistent with USEPA technical guidance[7], and to the extent possible TMDL development is based on available and relevant scientific data, research, reports, and peer-reviewed literature. Best professional judgment and input from research scientists and resource professionals is used in cases where available scientific data is not as extensive as desired.

Health and Safety Code Section 570 04 requires all Cal/EPA organizations to submit for external scientific review the scientific basis and scientific portion of all proposed policies, plans and regulations. Additionally, Health and Safety Code Section 57004(c) states:

> "No person may serve as an external scientific peer reviewer for the scientific portion of a rule if that person participated in the development of the scientific basis or scientific portion of the rule."

Accordingly, staff provides an accounting of other participants who were involved with this TMDL projects below:

Sarah Greene, Technical Program Manager, Central Coast Water Quality Preservation Inc.

Surendra Dara Phd., Strawberry and Vegetable Advisor, University of California Cooperative Extension Crop Advisor

Kevin Peterson, Mobile Irrigation Lab. Leader, Cachuma Resource Conservation District of Santa Barbara County

G.W. Bates, District Engineer, Coastal San Luis Resource Conservation District

Julie Wolfgang von Fallon, Cachuma Resource Conservation District of Santa Barbara County

Brian Anderson, Research Specialist, University of California Davis Marine Pollution Laboratory at Granite Canyon

Bryn Phillips, Research Specialist, University of California Davis Marine Pollution Laboratory at Granite Canyon

ATTACHMENT FOUR

LITERATURE REFERENCES AND ASSOCIATED WEBLINKS FOR SOURCES USED IN THE TMDL PROJECT REPORT

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ATTACHMENT FIVE

WATER, SEDIMENT AND FISH TISSUE CHEMISTRY NUMERIC TARGETS

Total Maximum Daily Loads (TMDLs) for Toxicity and Pesticides
in the Santa Maria Watershed

Table 1 Water Chemistry Numeric Targets

Chemical Group	Chemical	Conc.	Units	Endpoint	Reference
Organophosphate	Chlorpyrifos	0.025	ug/L (ppm)	CMC	(CDFG, 2000), (CCRWQCB, 2011) Appendix B Page 86
Organophosphate	Chlorpyrifos	0.015	ug/L (ppb)	CCC	(CDFG, 2000), (CCRWQCB, 2011) Appendix B Page 86
Organophosphate	Diazinon	0.16	ug/L (ppb)	CMC	(CDFG, 2000), (CCRWQCB, 2011) Appendix B Page 86
Organophosphate	Diazinon	0.1	ug/L (ppb)	CCC	(CDFG, 2000), (CCRWQCB, 2011) Appendix B Page 86
Organophosphate	Malathion	0.17	ug/L (ppb)	CMC	(Faria et al., 2010), Page 16
Organophosphate	Malathion	0.028	ug/L (ppb)	CCC	(Faria et al., 2010), Page 16
Synthetic Pyrethroid	Bifenthrin	0.004	ug/L (ppb)	CMC	(Palumbo et al., 2010), Page 22
Synthetic Pyrethroid	Bifenthrin	0.0006	ug/L (ppb)	CCC	(Palumbo et al., 2010), Page 22
Synthetic Pyrethroid	Cyfluthrin	0.0003	ug/L (ppb)	CMC	(Fojut et al., 2010) Page 19
Synthetic Pyrethroid	Cyfluthrin	0.00005	ug/L (ppb)	CCC	(Fojut et al., 2010) Page 19
Synthetic Pyrethroid	L-Cyhalothrin	0.001	ug/L (ppb)	CMC	(Fojut and Tjeerdema, 2010), Page 22
Synthetic Pyrethroid	L-Cyhalothrin	0.0005	ug/L (ppb)	CCC	(Fojut and Tjeerdema, 2010), Page 22

Chemical Group	Chemical	Conc.	Units	Endpoint	Reference
Organochlorine	Chlordain	0.00057	ug/L (ppb)	Human Health Consumption	(EPA 2000) Page 31715
Organochlorine	DDD, 4,4-(p,p-DDD)	0.00083	ug/L (ppb)	Human Health Consumption	(EPA 2000) Page 31715
Organochlorine	DDE, 4,4-(p,p-DDE)	0.00059	ug/L (ppb)	Human Health Consumption	(EPA 2000) Page 31715
Organochlorine	DDT, 4,4-(p,p-DDT)	0.00059	ug/L (ppb)	Human Health Consumption	(EPA 2000) Page 31715
Organochlorine	Dieldrin	0.00014	ug/L (ppb)	Human Health Consumption	(EPA 2000) Page 31715
Organochlorine	Toxaphene	0.00073	ug/L (ppb)	Human Health Consumption	(EPA 2000) Page 31715

CMC – Criterion Maximum Concentration (Acute: 1- hour average). Not to be exceeded more than once in a three year period

CCC – Criterion Continuous Concentration (Chronic: 4-day (96-hour) average). Not to be exceeded more than once in a three year period

Table 2 Sediment Chemistry Numeric Targets

Chemical Group	Chemical	Conc.	Units	Endpoint	Reference
Organophosphate	Chlorpyrifos	399	ng/g (ppb)		Brown et al. 1997
Organophosphate	Chlorpyrifos	1.77	ug/g o.c. (ppm)	average 10-d median lethal concentration (LC50)	(Amweg and Weston 2007) Page 2391
Synthetic Pyrethroid	Bifenthrin	0.52	ug/g o.c. (ppm)	average 10-d median lethal concentration (LC50)	(Amweg et al., 2005) Table 2
Synthetic Pyrethroid	Cyfluthrin	1.08	ug/g o.c. (ppm)	average 10-d median lethal concentration (LC50)	(Amweg et al., 2005) Table 2
Synthetic Pyrethroid	Cypermethrin	0.38	ug/g o.c. (ppm)	average 10-d median lethal concentration (LC50)	(Maund et al., 2002) mean value
Synthetic Pyrethroid	Esfenvalerate	1.54	ug/g o.c. (ppm)	average 10-d median lethal concentration (LC50)	(Amweg et al., 2005) Table 2

Chemical Group	Chemical	Conc.	Units	Endpoint	Reference
Synthetic Pyrethroid	Lambda Cyhalothrin	0.45	ug/g o.c. (ppm)	average 10-d median lethal concentration (LC50)	(Amweg et al., 2005) Table 2
Synthetic Pyrethroid	Permethrin	10.83	ug/g o.c. (ppm)	average 10-d median lethal concentration (LC50)	(Amweg et al., 2005) Table 2
Organochlorine	Chlordane	1.7	ug/kg o.c. (ppb)	Human Health-Based	(WDOH, 1995)Page 24, (MacDonald et al. 2003) Page 109
Organochlorine	p,p-DDD	9.1	ug/kg o.c. (ppb)	Human Health-Based	(WDOH, 1995)Page 24, (MacDonald et al. 2003) Page 109
Organochlorine	Sum DDE	5.5	ug/kg o.c. (ppb)	Human Health-Based	(WDOH, 1995)Page 24, (MacDonald et al. 2003) Page 109
Organochlorine	Sum DDT	6.5	ug/kg o.c. (ppb)	Human Health-Based	(WDOH, 1995)Page 24, (MacDonald et al. 2003) Page 109
Organochlorine	Total DDT	10	ug/kg o.c. (ppb)	Human Health-Based	(WDOH, 1995)Page 24, (MacDonald et al. 2003) Page 109
Organochlorine	Dieldrin	0.14	ug/kg o.c. (ppb)	Human Health-Based	(WDOH, 1995)Page 25, (MacDonald et al. 2003) Page 109
Organochlorine	Endrin	550	ug/kg o.c. (ppb)	Human Health-Based	(WDOH, 1995)Page 25, (MacDonald et al. 2003) Page 109
Organochlorine	Toxaphene	20	ug/kg o.c. (ppb)	Human Health-Based	(MacDonald et al. 2003) Page 109

o.c. organic carbon normalized concentrations

Table 3 Fish Tissue Chemistry Targets

Chemical Group	Chemical	Conc.	Units	Endpoint	Reference
Organochlorine	Chlordanes	5.6	ng/g (ppb)	Fish Contaminant Goal	(OEHHA, 2008) Page 61
Organochlorine	DDTs	21	ng/g (ppb)	Fish Contaminant Goal	(OEHHA, 2008) Page 61
Organochlorine	Dieldrin	0.46	ng/g (ppb)	Fish Contaminant Goal	(OEHHA, 2008) Page 61
Organochlorine	Toxaphene	6.1	ng/g (ppb)	Fish Contaminant Goal	(OEHHA, 2008) Page 61